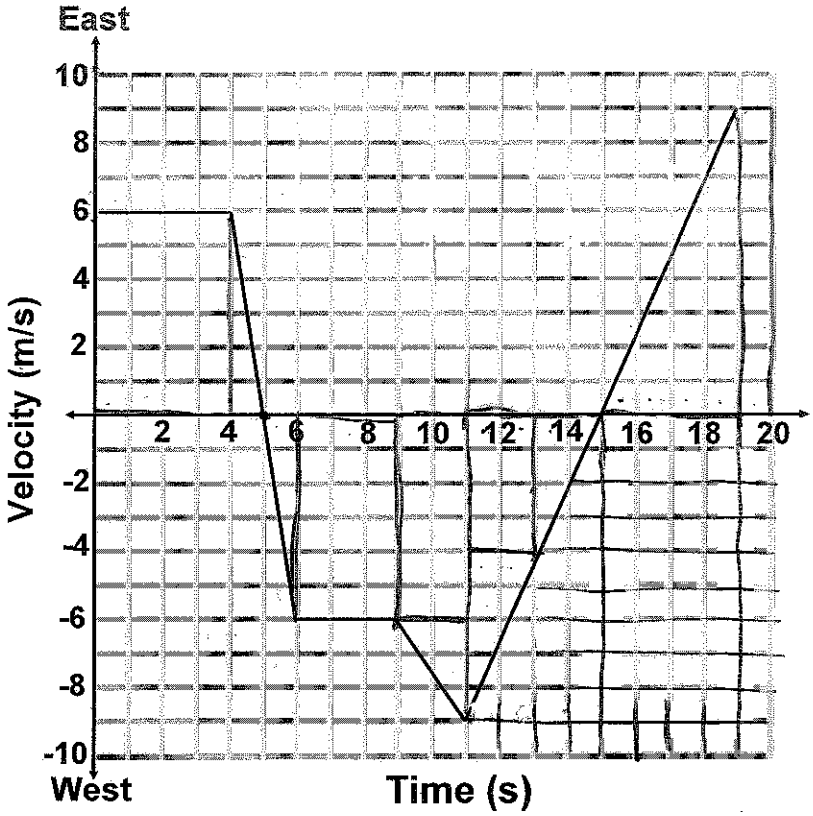
Velocity - Time: Course Review #2



1. What is the instantaneous velocity at the 11 second mark?

-9m/s (W)

2. At what time(s) did the object change direction?

5s and 15s

3. Calculate the distance traveled during the first 5 seconds. (27 m)

d = area under the graph

distance = 27m

$a = vt$
$= (6)(4)$
$= 24$

$a = \frac{1}{2}vt$
$= \frac{1}{2}(6)(1)$
$= 3$

4. During what time interval(s) was the acceleration opposite the direction of motion?

4-5s and 11s-15s

5. Calculate the distance traveled between 11 and 19 seconds. (45 m)

$d_{(11s)} = \frac{vt}{2}$
$= \frac{(9)(4)}{2}$
$= 18m$

$d = \frac{vt}{2}$
$d = \frac{(9)(4)}{2}$
$d = 18m$

36m

6. Calculate the acceleration at 4.5, 8 and 13.5 seconds. (-6 m/s²; 0 m/s²; 2.25 m/s²)

4.5s $a = \frac{v_f - v_0}{t_f - t_0} = \frac{-6-6}{6-4} = \frac{-12}{2} = -6 m/s^2$

8s horizontal line $= 0 m/s^2$ no change in velocity = no acceleration

13.5s $a = \frac{v_f - v_0}{t_f - t_0} = \frac{9-(-9)}{19-11} = \frac{18}{8} = 2.25 m/s^2$

7. Calculate the total distance traveled during the 20 seconds. (~~111 m~~ 107m)

add all the areas

0-5 = 27m

5-15

$\frac{vt}{2} = \frac{(-6)(1)}{2} = 3m$

$vt = (3)(6) = 18m$

$vt = (6)(2) = 12m$

$\frac{vt}{2} = \frac{(3)(2)}{2} = 3m$

$\frac{vt}{2} = \frac{(5)(2)}{2} = 5m$

$vt = (4)(2) = 8m$

$\frac{vt}{2} = \frac{(4)(2)}{2} = 4m$

$\frac{vt}{2} = \frac{(4)(9)}{2} = 18m$

$vt = (1)(9) = 9m$

d = 107m

8. Calculate the position of the object at the 20 second mark. (-3 m)

same as displacement which is top area - bottom area

top area = 27m + 27m = 54m

bottom area = 53m

54 - 53m

1m

9. Calculate the average speed and velocity for the full 20 seconds. (5.6 m/s; -0.15 m/s)

$v_{speed} = \frac{d}{t}$

$= \frac{107m}{20}$

$= 5.4 m/s$

$v_{avg} = \frac{\Delta d}{t}$

$= \frac{-1m}{20}$

$= 0.05 m/s$

10. Assume the object started at position (0,0). Without extensive calculations, estimate at what point in time the object had instantaneously returned to its starting position. (~ 10s)

need to look @ where the top and bottom areas of the graph are ~ equal in size which would be ~10 s